

REMARKS

Due to the numerous grammatical and idiomatic errors contained in the originally filed abstract and specification, Applicant is enclosing herewith a substitute abstract and specification including "clean" and "marked-up" copies. The undersigned hereby certifies, to the best of his knowledge and belief, that the enclosed substitute abstract and specification do not contain any "new matter".

The claims have been amended in order to more particularly point out and distinctly claim the subject matter which Applicants regard as the invention and correct minor grammatical and idiomatic errors contained therein. Additionally, Claim 8 has been added in order to further distinguish the claimed invention over the cited prior art. No new matter has been added.

Claims 5-7 have been objected to. It is respectfully submitted that the currently presented claims have been amended to overcome all of the claim objections.

Claims 1-7 have been rejected under 35 USC 102(b) as being anticipated by Fujiwara et al. Applicants respectfully traverse this ground of rejection and urge reconsideration in light of the following comments.

The presently claimed invention is directed to a method of producing a cathode material for a lithium secondary cell. The method comprises the steps of preparing a solution selected from the group consisting of an alkaline solution, a carbonate solution, and a hydrogencarbonate solution, with either an oxide or a carbonate of a metal, as the major component of the cathode material for the lithium secondary cell, suspended therein, dripping an aqueous solution of a salt of another element into the solution, precipitating and bonding a compound of the other element on the surface of the oxide or carbonate of the metal, as the major component, preparing a mixture by mixing the oxide or the carbonate of the metal, as the major component, with the compound of the

other element, precipitated and bonded thereon, with a lithium compound, and firing the mixture.

That is, in the present invention, there are four crucial steps. In the first step, a solution is prepared from an alkaline solution, a carbonate solution or a hydrogencarbonate solution, with the solution having an oxide or carbonate of a metal suspended therein. In the second step, an aqueous solution of a salt of another element is dripped into the solution to precipitate and bond a compound of the other element on the oxide or carbonate of the metal. In the third step, the oxide or carbonate of the metal with the compound of the other element precipitated and bonded thereon is mixed with a lithium compound to form a mixture and, in the fourth step, the mixture is fired.

As discussed in the present specification, the present invention is based on the discovery that when doping a cathode material for a lithium secondary cell, if a doping method is adopted in which a compound of a doping element is first precipitated and bonded on the surface of a compound of a metal, as the major component of the cathode material for a lithium secondary cell, in powdery form, by the use of a chemical method and, subsequently, the compound of the metal having the doping element deposited thereon is mixed with a lithium compound and subsequently fired, a cathode material is obtained which gives the lithium secondary cell excellent initial capacity, cycle characteristics and safety. It is respectfully submitted that the prior art cited by the Examiner does not disclose the presently claimed invention.

The Fujiwara et al reference discloses a method of producing a positive active material for a non-aqueous electrolyte secondary battery comprising the steps of firing a mixture of a nickel-metal oxide, in which the metal is dissolved as a solid solution, and lithium hydroxide or a hydrate thereof. As the method of producing the nickel-metal oxide, in which the metal is dissolved as a solid solution, the Examples of this reference disclose the preparation of an

aqueous solution of mixed sulfates of nickel and the metal, adding an aqueous solution of sodium hydroxide thereto to form a precipitate in which nickel hydroxide and the metal hydroxide are uniformly dispersed therein by co-precipitation, washing the precipitate, filtering and drying the precipitate to obtain a nickel-metal hydroxide and thermally decomposing the nickel-metal hydroxide to produce the nickel-metal oxide. The nickel-metal oxide is then mixed with lithium hydroxide or a hydrate thereof and fired to produce the cathode material.

The present invention is distinguished from Fujiwara et al in that Fujiwara et al requires that the metal be dissolved as a solid solution in the nickel-metal oxide. The nickel-metal oxide having the metal dissolved as a solid solution is formed by preparing the mixed aqueous solution of nickel-sulfate and the metal sulfate, pouring an aqueous solution of sodium hydroxide into the mixed aqueous solution to obtain a precipitate in which nickel hydroxide and cobalt hydroxide are uniformly dispersed by co-precipitation, drying the precipitate to obtain a nickel-metal hydroxide and thermally decomposing this hydroxide. In contrast thereto, in the present invention, the raw material to be mixed with the lithium compound during the firing step is prepared by forming a solution selected from the group consisting of an alkaline solution, a carbonate solution, and a hydrogencarbonate solution, with either an oxide or a carbonate of a metal, as the major component of the cathode material, suspended therein, dripping an aqueous solution of a salt of another element into the solution, precipitating and bonding a compound of the other element on the surface of the oxide or carbonate of the metal, forming a mixture with a lithium compound, and firing the mixture. In the present invention, the compound of the other element is precipitated and bonded on the surface of the oxide or carbonate of the metal in order to form a cathode material having a very high doping uniformity.

An additional distinction between the present invention and the process disclosed in Fujiwara et al is that a hydrolyzing step to obtain a nickel-metal oxide having the metal dissolved therein as a solid solution is not necessary. As such, it is not necessary to worry about an adverse affect as found in the raw material in which the co-precipitate of the nickel-cobalt hydroxide was hydrolyzed as discussed in Column 11, lines 49-56, of Fujiwara et al. Therefore, it is respectfully submitted that the Fujiwara et al reference does not even present a showing of prima facie obviousness under 35 USC 103(a) with respect to the presently claimed invention.

Even though the Examiner has not presented a showing of prima facie obviousness under 35 USC 103(a), objective evidence is of record in the present application which would be more than sufficient to rebut any proper showing of prima facie obviousness under 35 USC 103(a). On pages 8-21, Examples and Comparative Examples are presented in which the Comparative Examples are closer to the presently claimed invention than the disclosure of Fujiwara et al. As shown by the results contained in Tables 1-7, the present invention produces a cathode active material having unexpectedly superior properties to the cathode active materials prepared by the comparative processes. This is clearly unexpected in light of the prior art cited by the Examiner and establishes the patentability of the presently claimed invention thereover.

The Examiner is respectfully requested to reconsider the present application and to pass it to issue.

Respectfully submitted,


Terryence F. Chapman

TFC/smd

FLYNN, THIEL, BOUTELL	Dale H. Thiel	Reg. No. 24 323
& TANIS, P.C.	David G. Boutell	Reg. No. 25 072
2026 Rambling Road	Terryence F. Chapman	Reg. No. 32 549
Kalamazoo, MI 49008-1631	Mark L. Maki	Reg. No. 36 589
Phone: (269) 381-1156	Liane L. Churney	Reg. No. 40 694
Fax: (269) 381-5465	Brian R. Tumm	Reg. No. 36 328
	Steven R. Thiel	Reg. No. 53 685
	Donald J. Wallace	Reg. No. 43 977
	Sidney B. Williams, Jr.	Reg. No. 24 949

Encl: Replacement Abstract
Clean Substitute Specification
Marked-Up Substitute Specification
Postal Card

136.07/05